September 14, 2004

DEQ seeks comment on proposed ground water monitoring guidelines for recharge projects

BOISE — The Idaho Department of Environmental Quality (DEQ) is seeking public comment on proposed guidance designed to assure protection of ground and surface water quality in areas where water recharge projects are undertaken.

Water recharge is a process of replenishing natural aquifers through infiltration into the soil and geological formation from water delivery systems to infiltration basins.

Developed in consultation with the Idaho Department of Water Resources, the "Guidelines for Development of a Ground Water Monitoring Program for Recharge Projects" provide assistance on developing monitoring programs to demonstrate that recharge projects will not adversely affect beneficial uses of waters of the state.

The guidance document also outlines requirements that must be met to obtain DEQ approval of ground water monitoring programs for recharge projects.

The document does not apply to wastewater-land applications or recharge water applied through the use of injection wells. If the source of recharge water is treated wastewater, the recharge projects are subject to the state wastewater-land application permit rules.

The guidance document is available for review at DEQ's State Office in Boise and in PDF format on DEQ's Web site (download at left).

DEQ will accept public comment on the document through 5 p.m. MDT, Friday, October 15, 2004.

Submit written questions, comments, and requests to:

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GUIDELINES FOR DEVELOPMENT OF A GROUND WATER MONITORING PROGRAM FOR RECHARGE PROJECTS

1.0 PURPOSE

The purpose of this guidance is to set forth a process for interested parties of recharge projects to demonstrate that the project will not adversely affect a beneficial use of waters of the state. This guidance document provides details of the requirements for DEQ to approve a ground water monitoring program for a recharge project. This guidance document does not apply to wastewater land applications or recharge water applied through the use of injection wells. If the source of recharge water is treated wastewater, then the project is subject to the Wastewater Land Application Permit Rules (IDAPA 58.01.17).

2.0 INTRODUCTION

Recharge projects have the potential to impact ground and surface waters. The legislature adopted the Ground Water Quality Protection Act and the Idaho Ground Water Quality Plan that directs individuals seeking to conduct recharge projects to act consistently with the policies for water quality protection set forth in the Ground Water Quality Plan. The plan provides that the state shall prevent the contamination of ground water to the maximum extent practical.

This guidance document will assist interested parties or project managers in complying with the legislative mandates and the Department of Environmental Quality's (DEQ) rules. The Statement of Authority (Section 3.0) generally describes the statutes and rules that apply to recharge projects. Applicable DEQ Rules (Section 4.0) outlines specific DEQ rules that apply to recharge projects. The Process Overview (Section 5.0) section lists the steps necessary to receive DEQ approval of a ground water monitoring program for an aquifer recharge project. The main section (Section 6.0) of this guidance document is the Contents of a Ground Water Monitoring Program. Section 6.0 provides interested parties or project managers with information necessary to develop ground water quality monitoring programs.

3.0 STATEMENT OF AUTHORITY

The Ground Water Quality Protection Act (Idaho Code §39-102(3)(a)) states that "it is the policy of the state to prevent contamination of ground water from any source to the maximum extent practical" and (Idaho Code §39-102(3)(c)) states "all persons in the state should conduct their activities so as to prevent the nonregulated release of contaminants into the ground water." The Ground Water Quality Protection Act (Idaho Code §39-120(1)) designates DEQ as the primary agency to coordinate and administer ground water quality protection programs for state (http://www3.state.id.us/cgi-bin/newidst?sctid=390010020.K).

The Ground Water Quality Protection Act provides for the development of a Ground Water Quality Plan ("Plan") to be submitted to and approved by the Idaho legislature (Idaho Code §39-122 through 124(1989)). The Plan was adopted by the fifty first legislature in the second regular session (1992,ch.310 §1). Ground Water Protection Policy I-B of the Plan states: "the policy of the state of Idaho is that existing and projected future beneficial uses of ground water shall be maintained and protected, and degradation that would impair existing and projected future beneficial uses of ground water and interconnected surface water shall not be allowed." In part the intent of Ground Water Protection Policy I-B is to "ensure that the quality of ground water

that discharges to surface water does not impair identified beneficial uses of the surface water" (Ground Water Quality Plan, 1992).

Ground Water Quality Monitoring Policy V-C of the Plan states: "the policy of the state of Idaho is that any program designed specifically for the artificial recharge of ground water, existing or proposed, be consistent with the policies and management objectives for water quality and quantity." In part this Policy was adopted because "artificial recharge has the potential to significantly impact the quality of ground water." This section of the Ground Water Quality Plan directs DEQ, in cooperation with other appropriate agencies, to develop guidelines, management practices, and rules to insure that artificial ground water recharge projects comply with the Ground Water Quality Plan (1992).

The Department of Environmental Quality (DEQ), under the Water Quality Standards and Wastewater Treatment Requirements (IDAPA 58.01.02.600 Land application of Wastewater(s) or Recharge Waters http://www2.state.id.us/adm/adminrules/rules/idapa58/0102.pdf) and the Ground Water Quality Rule (IDAPA 58.01.11 http://www2.state.id.us/adm/adminrules/rules/idapa58/0111.pdf) is authorized to approve ground water monitoring programs for aquifer recharge projects.

DEQ may consider allowances for degradation of ground water quality up to Ground Water Quality Standards (IDAPA 58.01.11.200.) or other standards that are protective of more sensitive beneficial uses provided an existing or future beneficial use will not be adversely affected and that best management practices will be applied.

DEQ is aware of the widespread social and economic considerations of recharge projects and recognizes the importance of these projects to help minimize ground water depletions. DEQ has an obligation to review monitoring programs for recharge projects to ensure that ground water will not be degraded and that negative impacts will not occur to a beneficial use of ground or surface water. DEQ may also review the recharge project method of application, site specific location conditions, and source of recharge water to ensure compliance with the Ground Water Quality Rule and Water Quality Standards.

Project managers should provide assurance that a current or future beneficial use of the waters of the state will not be adversely affected by recharge projects. The physical characteristics of the site, the existing ground water quality, and the water quality of the recharge water for the project must be appropriate in order to protect ground water quality. Potential changes in water quality resulting from the introduction of recharge water into an aquifer by infiltration should be identified. Due to the variability in site characteristics within Idaho, each project will be considered on a case-by-case basis.

Recharge projects should be developed by a qualified party with experience in subsurface resource evaluation practices. Qualified parties are typically environmental consultants with backgrounds in geology, hydrogeology, soil science, and geochemistry or related engineering disciplines. The soil, geology, and hydrologic conditions of both the recharge site and the affected subsurface area, along with the quality of the recharge water and ground water will determine the level of detail necessary for the recharge project program.

4.0 APPLICABLE DEQ RULES

This section describes the specific rules DEQ will consider when reviewing a Recharge Project. As set out below, a ground water monitoring program must be developed for recharge projects, and the monitoring program is subject to DEQ approval. In addition, DEQ rules contain provisions to ensure protection of ground water quality. DEQ may also provide comments regarding the ground water recharge project in order to help ensure that the project is consistent with DEQ ground water quality rules.

4.1 Land Application of Wastewater(s) or Recharge Waters -- 58.01.02.600

This section lists the applicable portion of the Water Quality Standards and Wastewater Treatment Requirements, Land Application of Wastewater(s) or Recharge Waters.

4.1.1 Applied Waters Restricted To Premises – 600.02. "... Recharge waters applied to the land surface must be restricted to the premises of the application site unless permission has been obtained from the Department authorizing a discharge into the waters of the state." To support the Department's decision whether to authorize the project all programs will need written documentation from the land owner(s) approving and requesting authorization to conduct a recharge project.

4.1.2 Monitoring – 600.04. "Provisions must be made for monitoring the quality of the ground water in proximity of the application (recharge) site. The ground water monitoring program is subject to approval by the Department. All data and reports resulting from the ground water monitoring program must be submitted to the Department upon request." The frequency and parameters to be monitored is dependant upon; the nature and volume of recharge water; the frequency and duration of application; and the characteristics of the soil mantle and lithology underlying the recharge site.

4.1.3 Basis for Evaluation – 600.05. "The evaluation for an approval to irrigate, either by sprinkling or flooding or surface spreading of wastewater material or by burying wastewater material or recharge water in the upper soil horizon as a method of treatment, must include, but will not necessarily be limited to, consideration of the following items:

a. ... Recharge waters will be considered provided it can be shown that land application will not adversely affect current or future beneficial uses of waters of the state.

b. The nature of the soils and geologic formations underlying the application site. The entity proposing the activity must provide reasonable assurance that the soils and site geology will provide the required level of treatment and will not allow movement of pollutants into the underlying ground water.

c. The ability of the soil and vegetative cover on the application site to remove the pollutants contained in the applied waters through the combined processes of consumptive use and biological and chemical inactivation."

4.2 Ground Water Quality Rule – 58.01.11

This section lists the applicable portions of the Ground Water Quality Rule. Aquifers in Idaho are split into three classifications which have slightly different management strategies. The Spokane Valley – Rathdrum Prairie aquifer is the only aquifer in Idaho that is classified as a sensitive resource aquifer. All other aquifers in the state are categorized as general resource aquifers. There are no aquifers classified as "other resource" and this classification is not discussed in this guidance. See section 300 of the rule for details of aquifer categorization.

4.2.1 Management of Activities with the Potential to Degrade Aquifers – 301.

01. Sensitive Resource Category Aquifers.

a. Activities with the potential to degrade Sensitive Resource aquifers shall be managed in a manner which maintains or improves existing ground water quality through the use of best management practices and best available methods.

b. Numerical and narrative standards identified in Section 200 shall apply to aquifers or portions of aquifers categorized as Sensitive Resource. In addition, stricter numerical and narrative standards, for specified constituents, may be adopted pursuant to Section 350 on a case by case basis and listed in Section 300.

02. General Resource Category Aquifers.

a. Activities with the potential to degrade General Resource aquifers shall be managed in a manner which maintains or improves existing ground water quality through the use of best management practices and best practical methods to the maximum extent practical (Underlining added for emphasis).

b. Numerical and narrative standards identified in Section 200 shall apply to aquifers or portions of aquifers categorized as General Resource.

4.2.2 Ground Water Contamination – 400.

01. Releases Degrading Ground Water Quality. No person shall cause or allow the release, spilling, leaking, emission, discharge, escape, leaching, or disposal of a contaminant into the environment in a manner that:

a. Causes a ground water quality standard to be exceeded;

b. Injures a beneficial use of ground water; or

c. Is not in accordance with a permit, consent order or applicable best management practice, best available method or best practical method.

02. Prevention Measures.

a. When a numerical standard is not exceeded, but degradation of ground water quality is detected and deemed significant by the Department, the Department shall take one (1) or more of the following actions:

i. Require a modification of regulated activities to prevent continued degradation;

ii. Coordinate with the appropriate agencies and responsible persons to develop and implement prevention measures for activities not regulated by the Department;

iii. Allow limited degradation of ground water quality for the constituents identified in Subsections 200.01.a. and 200.01.c., if it can be demonstrated that:

(1) Best management practices, best available methods or best practical methods, as appropriate for the aquifer category, are being applied (Underlining added for emphasis); and

(2) The degradation is justifiable based on necessary and widespread social and economic considerations; or

iv. Allow degradation of ground water quality up to the standards in Subsection 200.01.b., if it can be demonstrated that:

(1) Best management practices are being applied; and

(2) The degradation will not adversely impact a beneficial use.

b. The following criteria shall be considered when determining the significance of degradation:

i. Site specific hydrogeologic conditions;

ii. Water quality, including seasonal variations;

iii. Existing and projected future beneficial uses;

iv. Related public health issues; and

v. Whether the degradation involves a primary or secondary constituent in Section 200.

03. Contamination Exceeding A Ground Water Quality Standard. "The discovery of any contamination exceeding a ground water standard that poses a threat to existing or projected future beneficial uses of ground water shall require appropriate actions, as determined by the Department, to prevent further contamination. These actions may consist of investigation and evaluation, or enforcement actions if necessary to stop further contamination or clean up existing contamination, as required under the Environmental Protection and Health Act, Section 39-108, Idaho Code."

5.0 PROCESS OVERVIEW

The following provides an overview of the process to receive DEQ approval of a ground water monitoring program for a recharge project.

5.1 Pre-project Planning Meeting. It is recommended that persons (project managers) interested in conducting a recharge project contact the DEQ Regional Office to set up a pre-project consultation meeting.

5.2 Develop and submit a Recharge Ground Water Monitoring Program. Project managers or persons interested in conducting a recharge project will provide three (3) written copies and one (1) electronic version of the submitted materials suitable for posting on a website to the DEQ Regional Office. The major components of the program include:

1. Project Description
2. Recharge Area Characterization
3. Evaluation of Potential Impacts
4. Water Quality Monitoring Program
5. Management Practices

5.3 Public notice. DEQ may provide public notice to private property owners within the potential zone of influence and adjacent landowners within three hundred (300) feet of the project property line. Notification may be by certified mail, return receipt requested. The notification should inform the public of the potential risks associated with recharging ground water with surface water and include an opportunity to submit comments to the DEQ Regional Office. The comment period will extend for 30 days following the posting of the notice regarding the recharge project on the DEQ web site. All public comments shall be considered during the DEQ review period.

5.4 DEQ review period. The DEQ Regional Office will consider public comment and the submitted materials in making its decision. DEQ will review the recharge project and respond within a reasonable timeframe. DEQ generally anticipates the timeframe to be 30 days from the end of the public comment period. The DEQ Regional Office will issue a letter that may approve, disapprove or approve with conditions the ground water monitoring program for a recharge project. DEQ may also provide comments regarding the method of application in order to help insure the project is consistent with DEQ's ground water quality protection rules. DEQ does not anticipate issuing a wastewater land application permit for a recharge project.

5.5 Opportunity for Appeal. Idaho Code § 39-107 and the Rules of Administrative Procedure Before the Board of Environmental Quality IDAPA 58.01.23 provide that any person aggrieved by an action or inaction of DEQ may initiate a Contested Case by filing a Petition for a Contested Case with the Board of Environmental Quality within 35 days of the action or inaction of DEQ. Persons aggrieved by DEQ's action with respect to water recharge projects may be entitled to initiate such a Contested Case.

5.6 Reporting. The project manager should provide a reporting schedule for monitoring results, an annual report and an expedited report when monitoring results meet or exceed an alert level. If an alert level is reached, the DEQ Regional Office should be notified within 24 hours of receipt of laboratory results. Routine water quality reports with field parameter sheets will be submitted to the DEQ Regional Office within 10 days of receipt of laboratory results. The reporting of monitoring results within 10 days of receipt may be reduced following review of an annual report. An annual report is to be submitted by January 30th of each calendar year to the DEQ Regional Office. The annual report will outline the previous years recharge activities including a summary of all water quality monitoring results and recorded hydrogeologic changes.

5.7 Annual Project Review. The DEQ Regional office will consult with IDWR for review of all routine water quality reports and the annual report. Based on the results, modifications to the project may be necessary. In the event ground water quality is degraded by recharge water, DEQ may require additional monitoring, modification of recharge practices, or cessation of the activity. Additional monitoring may include increased frequency of sampling events at selected existing wells, and/or installation of new monitoring wells. The use of best management practices or best practical methods may be required as modifications to the recharge activity.

6.0 CONTENTS OF A GROUND WATER MONITORING PROGRAM

The approval of a recharge ground water monitoring program will be considered on a case-by-case basis, and is based on the information submitted in the program. Programs are expected to be submitted to DEQ Regional Offices from project managers, individuals or groups proposing to conduct a recharge project. Recharge projects may be designed to either offset ground water depletions or augment stream and spring flows. Interested parties may be the project manager, recharge site landowner, or a group or individual with an easement or other authorization from a landowner to conduct a recharge project. The contents of a recharge ground water monitoring program include:

1. Project Description,
2. Recharge Area Characterization,
3. Evaluations of Potential Impact,
4. Water Quality Monitoring Program, and
5. Description of Management Practices.

6.1 Project Description

The project manager should provide a legal description of the recharge basin, a physical description of the basin, land ownership, the intended purpose of the recharge activity, expected outcome, and a mailing list of adjacent property owners. The project description should also include the source, diversion location and type of water used for recharge, the expected volume of water, project duration, project delivery system, and a general site map.

6.2 Recharge Area Characterization

The area to be characterized for the recharge project will include the basin site and all down-gradient areas that could be affected by the project. Down-gradient areas are generally the two-year time of travel as described in Section 6.2.2.b. The project manager should provide a characterization that includes identification of recharge area soils, geology, hydrogeology, potential contaminant sources, land use, vegetation, and surface water features. Maps to be included as a part of the recharge area characterization consist of:

1. Soils/Surficial Geologic Map,
2. Hydrogeologic and Surface Water Feature Map, and
3. Contaminant Source/Land Use/Vegetation Map.

6.2.1 Soil and Surficial Geology - Map and Description

The project manager should provide a soils and geologic map of the area.

6.2.1.a. Soils

The soil types should be identified by thickness, organic matter content, textural class, bulk density, permeability, available water holding capacity, and cation exchange capacity for each soil type. The Natural Resources Conservation Service (NRCS) and the Soil Conservation Commission (SCC) may provide useful soil information. The soils should act as a filtration system that can remove microbial organisms or act as a sorption material for attenuating chemical contaminants of the recharge water. In general, a minimum soil thickness for filtration is two feet, but will be dependent on the soil type. Test pits or borings may be required to

adequately determine soil types and thickness in areas with limited existing data. Provide on the map the test pit and boring locations, along with the areal extent of the soils.

In areas without adequate soil cover and where the project manager proposes to import soil to the site, it is **strongly recommended** to present the proposal to DEQ prior to importing soils. Specific details regarding requirements for such sites will be determined on a case-by-case basis.

6.2.1.b. Geology

Geologic features to be identified include lithology, outcrops, faults, fractures, and joint patterns. Exposed rock outcrops, fractures or faulting zones could act as direct conduits for the recharge water to enter the ground water with out the benefit of filtration.

6.2.2 Hydrogeologic and Surface Water Features - Map and Description

A hydrologic map should be provided that includes the location of springs, wells, hydrogeologic boundaries, surface water features, including canals and diversion structures. The configuration of the recharge basin should be put on this map along with the delivery system of the recharge water. In cases of considerable transport distance, a description may be appropriate.

6.2.2.a. Vadose Zone Characterization

The vadose zone is considered as the unsaturated material between land surface and the water table. A description of the vadose zone should be provided that includes the thickness, lithologic characteristics and hydraulic properties (such as hydraulic conductivity in the vertical and horizontal directions).

6.2.2.b. Aquifer System Characterization

The aquifer system is considered to be all subsurface zones between the vadose zone and the base of the water bearing geologic material. A description of the aquifer system should include the areal extent, thickness, hydraulic conductivity, boundary conditions, hydraulic gradient, ground water flow direction (regional and local), storage potential, and natural ground water flow velocity. In the case of a multiple aquifer system, the parameters for that portion(s) of the system that will be affected by the recharge activity should be described. A description of the extent, porosity and thickness of any confining layers should also be provided.

A description of potential impacts that could affect a beneficial use of ground water within the aquifer system should be provided. If information is available, the anticipated changes in the direction of ground water flow and a description of subsurface geology including any potential perching units that may intercept the recharging water or impede recharge should be provided.

In order to provide the aquifer characteristics described above and to determine the availability of existing wells that may serve as sampling sites for the monitoring program, an inventory of up and down-gradient wells is recommended. The Idaho Department of Water Resources (IDWR) maintains a well log search web site (http://www.idwr.state.id.us/water/well/search.htm). Microfiche of well logs are also available at the IDWR State or regional offices. Copies of well logs within the area should be provided and located on the hydrologic map.

Drilling logs can provide depth to water, specific capacity estimates, lithologic descriptions of the subsurface and well construction details. By locating wells on a topographic map,

generalized elevations can be determined for the top of casing, water table and lithologic zones. The hydraulic gradient can be calculated from this procedure. Hydraulic conductivity and porosity can be determined from published recognized values for the respective lithology. Ideally hydraulic conductivity should be determined on a site-specific basis through the use of appropriately designed and conducted aquifer tests.

The down-gradient wells should encompass a two-year time of travel to evaluate potential impacts to down gradient receptors. The two-year time of travel criteria is based on estimated ground water flow velocity at the site, and the potential for transport and die-off of pathogens in the subsurface. The travel time estimate can be calculated from measured or estimated values of the hydraulic conductivity, hydraulic gradient, and porosity. The up-gradient wells should be located within a 1-mile distance up-gradient from the site.

Other resources for hydrogeologic information includes published hydrogeologic investigations conducted in the area by various agencies such as the United States Geological Survey (USGS), Department of Water Resources IDWR, Department of Environmental Quality (DEQ), Department of Agriculture (ISDA), and the Idaho Water Resource Research Institute (IWRRI).

6.2.2.c. Springs

Springs can be located from a site survey, maps and remote sensing images. Springs should be noted on the hydrogeologic map. A description of each spring should include the discharge rate and any other pertinent information. Springs may serve as potential sampling sites for the monitoring program (See Section 6.2.2.b).

6.2.2.d. Surface Water Features

Streams (including intermittent), rivers, canals and ditches should be located on the hydrogeologic map. All structures, diversions and features associated with recharge operations should also be located on the map. If the recharge site is within a 100-year flood plain, that information should be provided. The Federal Emergency Management Agency (FEMA) maps delineate 100-year flood plain areas and are available at http://www.fema.gov/. The 100-year flood plain designations may also be available at county offices. If the recharge site is within an area with a high potential to flood, then constructed berms, imported soils, and other recharge related structures have the potential to be washed out.

6.2.3 Contaminant Sources, Land Use, and Vegetation - Map and Description

A land use map should be provided that includes the locations of potential contaminant sources, known sources or contaminant plumes, land use structures (such as buildings, roads, buildings, etc.), and land use areas including vegetation type (such as irrigated agriculture, dry agriculture, urban, etc.). County land use maps, tax code maps or comprehensive plans may be a resource.

6.2.3.a. Contaminant Sources

Potential and known contaminant sources can be determined from site surveys, local knowledge and GIS coverages. Source Water Assessments for local Public Water Supply wells may be another resource to identify potential contaminant sources and are available at the local DEQ Regional Office. Potential contaminant sources may include cemeteries, septic systems, sand, gravel or mineral extraction operations, wastewater treatment facilities, industries, active agricultural land to include crop type and agricultural management practices, dairies or other

confined animal feeding operations, landfills, underground storage tanks, RCRA and CERCLA sites.

6.2.3.b. Land Use

Past, present and projected future land use and related structures at the site should be described. For example, if the site is currently or has been used for a landfill or feedlot, land use related residual contaminants might exist in the area. Such information can be obtained from local knowledge, GIS coverages and a site survey. Previous ownership records can provide historic land use activities and can be obtained from the local county assessor's office. County offices may be able to provide information regarding projected future land use. If land use changes occur during the recharge project, the project manager may be required to change the sampling program or recharge process. Public land ownership should also be shown on the map.

6.2.3.c. Vegetative Cover

The type and distribution of vegetation within the recharge area should be identified. A description of the consumptive use that includes the plant uptake properties should be provided for each species.

6.2.4 Confining Recharge Water to the Recharge Site

Prior to infiltration, the recharge water must be restricted to the premises of the application site (See IDAPA 58.01.02.600.02). Any structural controls or berms require to achieve containment of the recharge water to within the recharge site should be shown on the land use map.

6.3 Evaluation of Potential Impacts

The project manager must evaluate the project to determine consistency with the rules set out in section 5. In general, this means the project manager should evaluate the project to determine whether the project:

- Will result in lowering the current quality of ground or surface water;
- Will result in exceeding any ground water quality standard as set forth in the Ground Water Quality Rule; or
- Will adversely affect drinking water or other uses of ground or surface water.

The project manager should also evaluate the project to ensure it does not create any health or safety risks or nuisance conditions.

Recharge project managers need to consider those aspects of the recharge activity that may have the potential to affect the health and safety of the public or create a nuisance conditions. The project manager should provide a characterization that includes identification of all possible health hazards, safety concerns and nuisance scenarios and address what measures will be taken to minimize or prevent these scenarios from developing. All insect and weed control chemicals that may be used in the recharge basin or in the delivery system should be identified with anticipated recharge rates, amounts of recharge and preventative measures to avoid contamination of the recharge water.

Preventive measures such as fencing designed to prevent animals from entering the recharge basin may be necessary. Signs to notify the public of the recharge practice for safety reasons and the sensitivity of the area may be necessary.

6.4 Water Quality Monitoring Program and Sample Location Map

The purpose of a water quality monitoring program is to determine the effects of introducing recharge water into the ground water. Several site-specific factors (including site hydrogeology, filtration medium properties, ground water quality of the site, proximity of domestic wells, and recharge water quality) will determine the level of detail for the water quality monitoring program. If the recharge water is of higher quality than ground water at the site, or if the basin has high filtration potential, some monitoring requirements and/or parameters for the project may be waived. The project manager should provide a water quality monitoring program and sample location map.

The water quality monitoring program needs to evaluate potential changes in water quality and water levels resulting from the introduction of recharge water into the aquifer by land application. The program should include a description of equipment used to obtain field parameters, sampling procedures, holding times, and a description of the quality control and assurance that will be followed. The location of water quality monitoring sampling sites should include the ground water, springs, and recharge water locations and be depicted on the map.

6.4.1 Ground Water Quality

The project manager should provide baseline or ambient groundwater water quality data as part of the monitoring program. The number of samples necessary to determine baseline conditions will be determined on a case-by-case basis and discussed during the pre-project planning meeting. The results of the baseline ground water quality monitoring will be used to determine the parameters and frequency for water quality monitoring during and after recharge. Additional baseline ground water quality information may be available from the IDWR Statewide Monitoring Network, the USGS, ISDA or DEQ.

6.4.2 Ground Water Monitoring Locations

From the inventory of wells and springs (completed in section 6.2.2.b Aquifer System Characterization), the project manager should suggest locations to sample and monitor ground water quality. Sites should be selected based on the location with respect to ground water flow, well construction details, spring discharge, and access to the sample locations. The locations of monitoring sites should intercept all possible ground water flow directional changes caused by introducing recharge water to the aquifer.

The location and number of existing wells and springs will determine the need for the installation of new monitoring wells necessary to evaluate ground water quality. The evaluation for the need to install additional monitoring wells will be determined on a case-by-case basis. Locations for ground water samples should be located up-gradient, down-gradient and within the recharge site and should be shown on the water quality sampling configuration map.

6.4.3 Recharge Water Quality and Monitoring Locations

The project manager should provide baseline or ambient recharge water quality data as part of the monitoring program. This information may be available from the USGS Idaho Surface Water Quality Statewide Network, the U.S. Bureau of Reclamation (USBR) National Irrigation Water Quality Program (NIWOP), the Army Corps of Engineers (USACE), the Environmental Protection Agency (EPA), and the ISDA Agricultural Surface Water Quality Program. The

locations for sampling the recharge water should be shown on the sampling configuration map. The water quality of the recharge water should be evaluated and demonstrated that ground water will not be degraded by the introduction of the recharge water. The availability of the recharge water and the volume expected should also be described.

6.4.4 Water Quality Monitoring - Frequency

The project manager should provide a proposed frequency for water quality monitoring as part of the monitoring program. The elements to consider when developing a monitoring schedule are the ground water flow system, the availability and quality of the recharge water and the duration of recharge. Generally, ground water monitoring should occur prior to recharge, during recharge and after recharge. The recharge water should be monitored prior to recharge. All projects should plan to monitor water quality at least monthly. The monitoring frequency will need to be increased for locations that pose a higher risk of transporting contaminants to the ground water.

6.4.5 Water Quality Monitoring – Field Parameters

The project manager should provide a proposed list of field parameters for water quality monitoring as part of the monitoring program. Field measurements should include static water level measurements in all wells. When monitoring wells, springs and recharge water, field measurements should include:

- Water temperature
- Specific Conductance/Total Dissolved Solids
- Dissolved Oxygen
- pH

6.4.6 Water Quality Monitoring - Laboratory analyses

Laboratory analyses will be necessary to evaluate chemical and pathogenic microbiological changes in water quality. Constituents of concern are those chemical and pathogenic microbial constituents that may be related to land use along the delivery system and within the recharge area.

The project manager should provide a proposed list of constituents for water quality monitoring as part of the monitoring program. All recharge projects should monitor for major anions and cations, bacteria, nutrients and an initial scan for pesticide, herbicides and volatile organic chemicals. The project manager is advised to contact the Idaho Department of Health and Welfare, Bureau of Laboratories for appropriate sample containers and sampling methods. DEQ may add additional constituents to the list of monitoring based on land use and management practices associated with the recharge project. See Appendix A for a list of constituents from the Ground Water Quality Rule. The following is a list of constituents to be monitored for all recharge projects:

Major Anions – Sulfate, bicarbonate alkalinity, chloride

Major Cations – Calcium, sodium, potassium, magnesium

Bacteria – Total and Fecal Coliform, E. Coli. and Fecal Streptococcus

Parasitic Protozoa – Cryptosporidium, Giardia,

Viruses – Coliphage

Nutrients - Phosphorous – Total and Ortho
-Total Nitrogen, TKN, Nitrate + Nitrite

Pesticide Scan - Immunoassay screen or EPA method 525 is recommended for pesticide specific analyses for both atrazine and alachlor.

Herbicide Scan - Immunoassay screen or EPA methods 515.1, including Magnacide H (Acrolein is the active ingredient – Unclassified Herbicide)

VOC Scan– Gas chromatograph and possibly including Xylene, EPA methods 524.2 or 502.2

DEQ may request analyses for additional constituents such as Total Organic Carbon (TOC) and for disinfectants and disinfectant by products as a result of treatment (see Section 6.5.3), on a case-by-case basis. TOC is used as an indicator for a range of organic compounds present in surface water. The presence or absence of organic compounds can determine the effectiveness of the filtration medium.

The project manager should consult with Idaho State Department of Agriculture, Division of Agricultural Resources, to determine the types of pesticides and herbicides being used in the recharge area and along the delivery system of the recharge water, and contact the State Lab for the analytical methods appropriate for their detection.

Analytical methods for microorganisms are frequently updated. Project managers are encouraged to consult with the American Society for Testing and Materials (ASTM International) or "Standard Methods for the Examination of Water and Wastewater, 20th edition, 1988, the American Public Health Association, and the Water Pollution Control Federation for the most recent method.

6.5 Management Practices

6.5.1 Reporting Schedule

The project manager should provide a reporting schedule for monitoring results, an annual report and an expedited report when monitoring results meet or exceed an alert level. If an alert level is reached, the DEQ Regional Office should be notified within 24 hours of receipt of laboratory results. Routine laboratory analyses and field sheets for recharge and ground water quality monitoring maybe submitted to the DEQ Regional Office within 10 days upon receipt of laboratory results. This activity may be reduced following review of an annual report. The annual report will outline the previous years of recharge activities including a summary of all water quality monitoring results and recorded hydrogeologic changes. An annual report for the project should be submitted to the DEQ Regional Office by January 30th of each calendar year.

When an immunoassay scan detects a pesticide or herbicide or a gas chromatograph detects volatile organic compound, that detection will be considered an alert level. For all other for constituents for which there is an EPA maximum contaminant level (MCL) for drinking water standards or the ground water quality standards established the alert level will be one-half the MCL. The MCL and alert level for those constituents are listed in Appendix A. If an alert level is reached, the DEQ Regional Office should be notified within 24 hours upon receipt of result. Appropriate actions or modifications may be required.

6.5.2 Contingency Plan

A contingency plan should be developed and submitted as part of the project program to address potential emergency situations at the recharge basin and in the recharge water delivery system. Examples of emergency situations may include:

- Misapplication of pesticides or herbicides to either the recharge basin or the water delivery system during a period of recharge.
- Animals grazing a recharge basin during a recharge event or just prior to a recharge event or if animals get access to the water delivery system.
- An accident involving a vehicle along the delivery system.
- Aerial application of pesticides or herbicides to the recharge basin or along the delivery system.

A notification procedure and plan of action should be included in the contingency plan.

6.5.3 Recharge Water Treatment

The project manager should provide a description of any treatment processes applied to the proposed recharge water to minimize or eliminate contamination from entering the ground water system. Should disinfectants be used in any treatment process, the disinfectant and disinfectant byproducts should be considered as a contaminant of concern and analyzed accordingly.

APPENDIX A

Ground Water Quality Standards IDAPA 58.01.11.200.1

Table I- Primary Constituent Standards

Chemical Abstract Service Number	Constituent	Standard (mg/l unless otherwise specified)	Alert Level (mg/l unless otherwise specified)
7440-36-0	Antimony	0.006	0.003
7440-38-2	Arsenic	0.05**	0.025**
1332-21-4	Asbestos	7 million fibers/l longer than 10 um	3.5 million fibers/l longer than 10 um
7440-39-3	Barium	2	1
7440-41-7	Beryllium	0.004	0.002
7440-43-9	Cadmium	0.005	0.0025
7440-47-3	Chromium	0.1	0.05
7440-50-8	Copper	1.3	0.65
57-12-5	Cyanide	0.2	0.1
16984-48-8	Fluoride	4	2
7439-92-1	Lead	0.015	0.0075
7439-97-6	Mercury	0.002	0.001
*	Nitrate (as N)	10	5
*	Nitrite (as N)	1	0.5
7782-49-2	Selenium	0.05	0.025
7440-28-0	Thallium	0.002	0.001
15972-60-8	Alachlor	0.002	Detection
1912-24-9	Atrazine	0.003	Detection
71-43-2	Benzene	0.005	Detection
50-32-8	Benzo(a)pyrene (PAH)	0.0002	Detection
75-27-4	Bromodichloromethane (THM)	0.1	Detection
75-25-2	Bromoform (THM)	0.1	Detection
1563-66-2	Carbofuran	0.04	Detection
56-23-5	Carbon Tetrachloride	0.005	Detection
57-74-9	Chlordane	0.002	Detection
124-48-1	Chlorodibromomethane (THM)	0.1	Detection
67-66-3	Chloroform (THM)	0.002	Detection
94-75-7	2,4-D	0.07	Detection
75-99-0	Dalapon	0.2	Detection
103-23-1	Di (2-ethylhexyl) adipate	0.4	Detection
96-12-8	Dibromochloropropane	0.0002	Detection
541-73-1	Dichlorobenzene m-	0.6	Detection
95-50-1	Dichlorobenzene o-	0.6	Detection
106-46-7	1,4(para)-Dichlorobenzene or Dichlorobenzene p-	0.075	Detection
107-06-2	1,2-Dichloroethane	0.005	Detection
75-35-4	1,1-Dichloroethylene	0.007	Detection
156-59-2	cis-1, 2-Dichloroethylene	0.07	Detection
156-60-5	trans-1, 2-Dichloroethylene	0.1	Detection
75-09-2	Dichloromethane	0.005	Detection
78-87-5	1,2-Dichloropropane	0.005	Detection
117-81-7	Di (2-ethylhexyl) phthalate	0.006	Detection
88-85-7	Dinoseb	0.007	Detection
85-00-7	Diquat	0.02	Detection
145-73-3	Endothall	0.1	Detection
72-20-8	Endrin	0.002	Detection

*No Chemical Abstract Service Number exists for this constituent.
**EPA drinking water standard Arsenic is currently 10 ug/l or 0.01 mg/l

Chemical Abstract Service Number	Constituent	Standard (mg/l unless otherwise specified)	Alert Level (mg/l unless otherwise specified)
100-41-4	Ethylbenzene	0.7	Detection
106-93-4	Ethylene dibromide	0.00005	Detection
1071-83-6	Glyphosate	0.7	Detection
76-44-8	Heptachlor	0.0004	Detection
1024-57-3	Heptachlor epoxide	0.0002	Detection
118-74-1	Hexachlorobenzene	0.001	Detection
77-47-4	Hexachlorocyclopentadiene	0.05	Detection
58-89-9	Lindane	0.0002	Detection
72-43-5	Methoxychlor	0.04	Detection
108-90-7	Monochlorobenzene	0.1	Detection
23135-22-0	Oxamyl (Vydate)	0.2	Detection
87-86-5	Pentachlorophenol	0.001	Detection
1918-02-1	Picloram	0.5	Detection
1336-36-3	Polychlorinated biphenyls (PCBs)	0.0005	Detection
122-34-9	Simazine	0.004	Detection
100-42-5	Styrene	0.1	Detection
1746-01-6	2,3,7,8-TCDD (Dioxin)	3.0 x 10-8	Detection
127-18-4	Tetrachloroethylene	0.005	Detection
108-88-3	Toluene	1	Detection
*	Total Trihalomethanes [the sum of the concentrations of bromodichloromethane, dibromochloromethane, tribromomethane (bromoform), and trichloromethane (chloroform)]	0.1	Detection
8001-35-2	Toxaphene	0.003	Detection
93-72-1	2,4,5-TP (Silvex)	0.05	Detection
120-82-1	1,2,4-Trichlorobenzene	0.07	Detection
71-55-6	1,1,1-Trichloroethane	0.2	Detection
79-00-5	1,1,2-Trichloroethane	0.005	Detection
79-01-6	Trichloroethylene	0.005	Detection
75-01-4	Vinyl Chloride	0.002	Detection
1330-20-7	Xylenes (total)	10	Detection
*	Gross alpha particle activity (including radium -226,but excluding radon and uranium)	15 pCi/l	7.5 pCi/l
*	Combined beta/photon emitters	4 millirems/yr effective dose equivalent	2 millirems/yr effective dose equivalent
*	Combined Radium – 226 and radium 228	5 pCi/l	2.5 pCi/l
*	Strontium 90	8 pCi/l	4 pCi/l
*	Tritium	20,000 pCi/l	10,000 pCi/l
*	Total Coliform	1 colony forming unit/100 ml	detection

*No Chemical Abstract Service Number exists for this constituent.
**EPA drinking water standard for arsenic is currently 10 ug/l or 0.01 mg/l.

The Secondary Constituent Standards are generally based on aesthetic qualities and are identified in Table II.

Table II – Secondary and Unclassified Constituent Standards, including Common Ions

Constituent	Standard (mg/l unless otherwise specified)	Alert Level (mg/l unless otherwise specified)
Acrolein	0.32	0.16
Aluminum	0.2	0.1
Bicarbonate[1]	--	--
Calcium[1]	--	--
Chloride	250	125
Color	15 Color Units	7.5 Color Units
Foaming Agents	0.5	0.25
Iron	0.3	0.15
Magnesium[1]	--	--
Manganese	0.05	0.025
Odor	3.0 Threshold Odor Number	1.5 Threshold Odor Number
Phosphorous, Total	0.025 mg/l for lakes/0.10 mg/l for streams	
Phosphorous, Ortho	0.025 mg/l for lakes/0.10 mg/l for streams	
pH	≥6.5 to ≤8.5 (no units apply)	<6.5; >8.5
Potassium[1]	--	--
Silver	0.1	0.05
Sodium[1]	--	--
Sulfate	250	125
Total Dissolved Solids	500	250
Zinc	5	2.5

[1]Common ions or other constituents for which no standard has been developed.

Table III - Microbial Constituents

Constituent	Standard (mg/l unless otherwise specified)	Alert Level (mg/l unless otherwise specified)
Bacteria		
E. Coli Bacteria[A]	--	detection
Fecal Coliform[A]	--	detection
Fecal Streptococcus[A]	--	detection
Heterotrophic Plate Count (HPC)[B]	500 colonies/ml	250 colonies/ml
Protozoa		
Cryptosporidium	99% removal	detection
Giardia lamblia	99.9% removal	detection
Viruses	99.99% removal	detection

[A]Bacterial constituents for follow-up sampling and analysis upon a positive total coliform (Table I) result.
[B] HPC is used as an indicator of recharge basin filtration efficiency.

APPENDIX B

Definitions

Aquifer. A geological unit of permeable saturated material capable of yielding economically significant quantities of water to wells or springs.

Beneficial Uses. Various uses of ground water in Idaho including, but not limited to, domestic water supplies, industrial water supplies, agricultural water supplies, aquacultural water supplies, and mining. A beneficial use is defined as actual current or projected future uses of ground water.

Best Available Method. Any system, process, or method which is available to the public for commercial or private use to minimize the impact of point or nonpoint sources of contamination on ground water quality.

Best Management Practice. A practice or combination of practices determined to be the most effective and practical means of preventing or reducing contamination to ground water and interconnected surface water from non-point and point sources to achieve water quality goals and protect the beneficial uses of the water.

Best Practical Method. Any system, process, or method that is established and in routine use which could be used to minimize the impact of point or non-point sources of contamination on ground water quality.

Contaminant. Any chemical, ion, radionuclide, synthetic organic compound, microorganism, waste or other substance which does not occur naturally in ground water or which naturally occurs at a lower concentration.

Contamination. The direct or indirect introduction into ground water of any contaminant caused in whole or in part by human activities.

Constituent. Any chemical, ion, radionuclide, synthetic organic compound, microorganism, waste or other substance occurring in ground water.

Degradation. The lowering of ground water quality as measured in a statistically significant and reproducible manner.

Delivery system. An existing canal system used for carrying surface water to an infiltration basin.

Ground Water. Any water of the state which occurs beneath the surface of the earth in a saturated geological formation of rock or soil.

Ground Water Quality Standard. Values, either numeric or narrative, assigned to any constituent for the purpose of establishing minimum levels of protection.

Infiltration Basin. A natural depression in the earth's surface that may be capable of holding water that is intended to percolate through soils and geologic formations to an aquifer.

Land Application. A process or activity involving application of wastewater, surface water, or semi-liquid material to the land surface for the purpose of disposal, pollutant removal, or ground water recharge.

Natural Background Level. The level of any constituent in the ground water within a specified area as determined by representative measurements of the ground water quality unaffected by human activities.

Projected Future Beneficial Uses. Various uses of ground water, such as drinking water, aquaculture, industrial, mining or agriculture that are practical and achievable in the future based on hydrogeologic conditions, water quality, future land use activities and social/economic considerations.

Qualified Party. An individual or firm with experience in soils, geology, hydrogeology, hydrology or similar field and recognized in Idaho as a Registered Professional Geologist, Engineer or Environmental Health Professional.

Recharge. The process of adding water to the zone of saturation.

Recharge Area. An area in which water infiltrates into the soil or geological formation from, including but not limited to precipitation, irrigation practices and seepage from creeks, streams, and lakes, and percolates to one (1) or more aquifers including introduced. (This includes specific areas managed for recharge.)

Recharge Water. Water that is specifically utilized for the purpose of adding water to the zone of saturation.

APPENDIX C

Acronyms

APHA	American Public Health Association	www.apha.org
ASTM	American Society for Testing and Materials	http://www.astm.org
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act Also known as "Superfund"	http://yosemite.epa.gov/R10/CLEANUP.NSF
DEQ	Idaho Department of Environmental Quality	http://www.deq.state.id.us
EPA	Environmental Protection Agency	http://epa.gov
FEMA	Federal Emergency Management Agency	http://www.fema.gov/
GIS	Geographic Information System	
IDWR	Idaho Department of Water Resources	http://www.idwr.state.id.us
ISDA	Idaho State Department of Agriculture	http://www.isda.state.id.us
NIWQP	National Irrigation Water Quality Program	http://www.usbr.gov/niwqp
NRCS	Natural Resources Conservation Service	http://www.ncgc.nrcs.usda.gov
RCRA	Resource Conservation and Recovery Act	http://www.epa.gov/enviro/index_java.html
SCS	Soils Conservation Commission	http://www.scc.state.id.us/
USACE	Army Corps of Engineers	http://www.usace.army.mil
USBR	U.S. Bureau of Reclamation	http://www.usbr.gov
USGS	U.S. Geological Survey	http://www.usgs.gov

Idaho Surface Water Quality Statewide Network http://id.water.usgs.gov.public/wq/index.html

mg/l	Milligrams per liter, units of measure
ml	Milliliter, unit of measure

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2220 Old Penitentiary Road, Boise, ID 83712-8299, Ph. 208.334.2235

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